DOCUMENT RESUME

ED 383 770 TM 023 323

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TITLE Assessing Students' Motivation and Learning Strategies: The Motivated Strategies for Learning Questionnaire.
PUB DATE Apr 95
NOTE 18p.; Paper presented at the Annual Meeting of the American Educational Research Association (San Francisco, CA, April 18-22, 1995).
PUB TYPE Reports - Research/Technical (143) -- Speeches/Conference Papers (150)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *College Students; *Educational Assessment; Educational Theories; *Evaluation Methods; Factor Structure; Goal Orientation; Higher Education; *Learning Strategies; Models; Pilot Projects; *Student Motivation; *Test Construction; Test Reliability; Test Use; Test Validity
IDENTIFIERS *Motivated Strategies for Learning Questionnaire

ABSTRACT

Some issues involved in the measurement of student motivation and learning strategies are explored, focusing on a self-report instrument, the Motivated Strategies for Learning Questionnaire (MSLQ). The MSLQ, designed to assess the motivational orientation and learning strategy use of college students and based on a social-cognitive view, has been under development since 1986 at the National Center for Research on Improving Postsecondary Teaching and Learning at the University of Michigan. Pilot testing resulted in refinements incorporated into a final version of the MSLQ designed to be given in class in 20 to 30 minutes. To test the utility of the theoretical model and its operationalization, MSLQ responses were gathered from 380 midwestern college students over 14 subjects and 5 disciplines. Results suggest that the MSLQ has relatively good reliability, and confirmatory factor analysis supports the validity of the general theoretical framework and the scales that measure it. Three general factors of student motivation are identified. In addition, the predictive validity seems reasonably good. The MSLQ seems to be a useful, reliable, and valid way to assess motivation and learning strategies in the classroom. One table and two figures present study data. (Contains 36 references.) (SLD)

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Assessing students' motivation and learning strategies: The Motivated Strategies for Learning Questionnaire

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TM023373

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Assessing students' motivation and learning strategies: The Motivated Strategies for Learning Questionnaire

Current research on student classroom learning stresses the importance of considering both motivational and cognitive components of academic performance (Garcia & Pintrich, 1994; Pintrich & De Groot, 1990). Motivational components include students' perceptions of the classroom environment as well as their self-related beliefs such as personal goals, self-efficacy, interest, and value beliefs. Cognitive components include students' content knowledge as well as various cognitive learning strategies such as rehearsal, elaboration, and organization, and metacognitive strategies such as planning, monitoring, and regulating learning (Garcia & Pintrich, 1994). Research in both experimental and field settings has consistently shown that positive motivational beliefs such as perceptions of high self-efficacy, a focus on mastery goals, high value and interest in the task or content, and low levels of test anxiety are positively related to greater cognitive engagement in terms of the use of cognitive and metacognitive strategies as well as actual academic performance (see Pintrich & Schrauben, 1992 for a review). Given that both motivational and cognitive components are important for classroom learning, issues regarding assessment become paramount. The goal of this paper is to address some of the issues involved in the measurement of motivation and learning strategies, with the main focus of the discussion on a specific self-report instrument, the Motivated Strategies for Learning Questionnaire (MSLQ).

The laboratory versus the classroom

There are a number of techniques that may be used in laboratory settings, including reaction time or think-aloud protocols to measure strategy use, and actual experimental manipulations to induce certain types of motivational goals (Ericsson & Simon, 1993; Graham & Golan, 1991). Although these types of techniques can provide good construct validity and ensure relatively high levels of internal validity, there is a tradeoff: these types of studies do sacrifice some external validity and generalizability to the classroom setting. For example, students have differing levels of personal interest and value for classroom academic tasks; in contrast, most laboratory tasks probably have low value for the typical student, as the artificiality of certain tasks such as ring-tossing or puzzle completion may make the activity seem unimportant or not meaningful to "real" life (however, the novelty of certain laboratory tasks can make them very interesting to students). Accordingly, if students' motivational beliefs for laboratory tasks may be qualitatively different from their motivational beliefs for classroom academic work, and if experimental settings may not adequately tap into the complex and multifaceted nature of students' beliefs regarding their classroom academic work, the question then becomes, how might we realistically assess these beliefs in the classroom and link them to students' cognitive and metacognitive learning strategies? For researchers who aspire to study

the interaction of motivation and cognition in a classroom setting, this presents a serious problem with no one "correct" solution, just tradeoffs among the strengths and weaknesses of various methods.

In terms of methods that can be used in a classroom setting, reaction time and think-aloud protocols are rather difficult to use in terms of pragmatic concerns and may also limit ecological validity. However, observations, stimulated recall, interviews, and questionnaires can all be used in classroom settings. Observations, including both high and low inference quantitative observational schemes as well as more qualitative and ethnographic techniques can be used to assess students' motivation and cognition. In fact, many indicators of motivation are behavioral in nature, such as choice of tasks, level of effort on tasks, and persistence at tasks. These three behaviors are all good indicators of a student who is motivated for the task. However, in most current motivational models, simple observation of the behaviors of choice, effort, and persistence is considered inadequate for characterizing student motivation. Both attribution theory (Weiner, 1986) and goal theory (Ames, 1992) suggest that students' perceptions of the task and themselves, as well as their achievement behaviors, have implications for future cognition, motivation, and affect. For example, in goal theory, two students may both demonstrate high levels of effort and persistence on an academic tasks, but if one is mastery-oriented and the other is performance-oriented, then these qualitative differences in goal orientation can have a dramatic effect on subsequent cognitions, attributions, motivation, and affect (Ames, 1992).

Accordingly, from this general constructivist perspective, it is very important to also collect data on students' perceptions and beliefs about the task and their behavior, not just the behavioral indices that can be generated from observational data. Of course, if the observational data include student speech and discourse in the classroom, the actual statements could be coded for indicators of student motivation (e.g., Thorkildsen & Nicholls, 1991) or actual strategy use (e.g., Corno, 1989). However, this type of observational data is not easy to collect or use. The collection and transcription of this type of data is very time-consuming. Moreover, the coding of the data is fraught with reliability and validity issues. In particular, it is not clear how to characterize the representativeness of the discourse and codes for other students or classrooms besides the ones actually in the sample (Carter, 1993).

Self-report measures in the classroom

Other self-report methods such as interviews and questionnaires are often the most practical and easy to use in classroom settings. They can be administered relatively easily, and in the case of self-report questionnaires with closed-ended items, scored and prepared for complex data analyses fairly quickly. Most importantly, given their ease of use, questionnaires can be used with large and diverse samples which can increase the generalizability of the findings. However, self-report data have been criticized in terms of their reliability and validity. We would now like to address these

criticisms and present evidence for the validity and reliability of our self-report instrument, the MSLQ.

Reliability of self-reports. In terms of reliability over time, Assor and Connell (1992) suggest that students' self-assessments of their competence may not be stable when they are quite young because in fact, children's perceptions of competence are changing quite rapidly as a function of development and experience. Nevertheless, these researchers note that children's perceptions of competence can show moderate stability, enough to meet basic psychometric requirements that allow for valid assessment (Assor & Connell, 1992). Indeed, this general issue of stability is pertinent not only to competence beliefs, but also to other motivational factors and to the use of cognitive strategies for learning. That is, it may be that the most adaptive or self-regulated learners do modify and change their beliefs and strategies as a function of the task or context. In this case, traditional estimates of stability over time are difficult to use.

Besides the stability issue, other researchers suggest that the internal consistency or coherence of factor structures generated from self-report questionnaires may vary with age (Pintrich & De Groot, 1990; Wigfield & Eccles, 1992). For example, in our own work, somewhat different factor structures emerge from our questionnaire data with junior high school and college students (cf., Pintrich & De Groot, 1990; Pintrich, Smith, Garcia, & McKeachie, 1993), but the results still fit within our general conceptual model. Future research needs to address whether these developmental differences in factor structures are a function of method variance or actually reflect developmental differences in cognition and motivation. Although these types of developmental differences make for interesting problems in building and elaborating theoretical models, they do not necessarily invalidate the use of self-report instruments as long as developmentally and methodologically appropriate factor structures are used.

Validity of self-reports. Besides these reliability issues, the overall validity of self-report questionnaires or interviews have been questioned throughout the history of empirical psychology. There are often concerns about the social desirability of students' responses. Although this is always a concern to keep in mind when using questionnaires or interviews, in our own work, when we have included measures of social desirability (e.g., the Crown-Marlowe social desirability scale), these measures of response bias did not account for any significant amount of variance and did not change our final results. In terms of motivational beliefs, there also is concern abut the inaccuracy of competence beliefs, in particular that students often overestimate their competence. However, Assor and Connell (1992) suggest that, although these beliefs may not reflect "reality" in terms of agreement with grades or achievement test scores, their longitudinal data shows that two years later, these inflated perceptions of competence actually do relate to achievement. Hence, these "overestimates" of competence are adaptive and help students who are not doing that well cope with the demands of the tasks and maintain their effort. In general, if one adopts a constructivist perspective regarding student

motivation, then it is crucial to assess students' perceptions of their own motivation, not just "objective" measures of motivation such as observations and teachers' or parents' reports.

The validity of self-reports of cognitive strategy use is not so easily resolved, however. In this case, students' self-reports from interviews or questionnaires may not reflect actual strategy use. Actual observations or some behavioral indicator of strategy use provide better construct validity. In addition, these behavioral measures can be used to assess the smaller "grain size" of the more basic or microlevel cognitive processes that make up cognitive and metacognitive strategy use (Howard-Rose & Winne, 1993). These measures are very useful in helping us understand which of the many possible cognitive processes or strategies contribute most to self-regulated learning. However, at the larger "grain size" of more global indicators of strategy use or metacognition, self-reports such as interviews or questionnaires can be quite useful. These more global measures can help us decide if any cognitive or metacognitive strategy use is taking place. For example, in our own work with the Motivated Strategies for Learning Questionnaire (MSLQ), we have found over and over again that the three general aspects of metacognition-planning, monitoring, and regulating, do not load into separate factors in a factor analyses, but just load into one factor. From this questionnaire data, we would not want to conclude that the theoretical distinctions between planning, monitoring, and regulating are not useful. We would leave the explication of the relations between the three aspects to more experimental studies where the processes could be examining in more microlevel detail. However, our results do suggest that when students engage in some aspects of metacognition, they tend to report doing all three aspects and they also do better in terms of actual achievement, which is in line with our general assumptions about self-regulated learning.

In addition, self-reports of strategy use can be improved when students are asked to report on concrete "behaviors" that they could engage in, not abstract cognitive operations. Accordingly, in our instrument development, we try to have items that ask students about actual behaviors they might use as they study their course material. For example, we ask students if they outline their course material or write short summaries of their readings and lecture notes to assess their use of cognitive strategies. For metacognition, we ask them if they reread course material when they can't understand it, not if they "monitor and regulate" their reading comprehension. Of course, some of our items are more global than those, but most students should be able to report if they engage in certain types of behaviors. However, there may be a lower developmental limit to young children's ability to use these type of self-report items. We have had success with the MSLQ with children as young as fifth and sixth grade, but in the early elementary grades these items may be difficult for them. It may be that they are not able to understand the items or lack the metacognitive awareness to even report on their own behavior. At the same time, it may not be just developmental, it may be that the nature of the context and the types of academic tasks in the early elementary grades do not provide affordances for the use of

these strategies. In this case, lacking the opportunities to develop strategies, we would not expect young children to be able to report on their use of strategies very well.

In any event, carefully designed self-report instruments can probably be used with students in the upper elementary grades and beyond. They can provide a relatively efficient and practical measure of students' motivation and use of learning strategies. In addition, depending on how they are constructed, they can be used to assess motivation and learning strategies in a manner that is ecologically valid for the classroom setting. In the remainder of this paper, we outline the development of one such instrument - the Motivated Strategies for Learning Questionnaire. We discuss the development of the questionnaire, present some data on the reliability and validity of the scales, and discuss how we have used it in our own research program on motivation and cognition in the classroom.

Description and Development of the Motivated Strategies for Learning Questionnaire

The Motivated Strategies for Learning Questionnaire (MSLQ) is a self-report instrument designed to assess college students' motivational orientation and their use of different learning strategies for a college course. The MSLQ is based on a general social-cognitive view of motivation and learning strategies, with the student represented as an active processor of information whose beliefs and cognitions are important mediators of instructional input and task characteristics. By focusing on the roles of both motivation and cognition in the classroom, the MSLQ also addresses recent advances in self-regulated learning, which emphasizes the interface between motivation and cognition (Schunk & Zimmerman, 1994; Zimmerman & Schunk, 1989). This theoretical framework distinguishes the MSLQ from many of the older study skill inventories (e.g., Brown & Holtzman, 1967; Christensen, 1968; Goldman & Warren, 1973), which have been criticized for being atheoretical (e.g., Weinstein & Underwood, 1985), and measures of learning styles, which proceed from an individual differences framework (e.g., Lockhart and Schmeck, 1984; Torrance, Reynolds, Riegel, & Ball, 1977). In contrast to another widely used self-report instrument, the Learning and Study Strategies Inventory (the LASSI, Weinstein, Palmer, & Schulte, 1987), the MSLQ takes a more detailed view of the motivational processes involved in self-regulated learning, and contextualizes motivation and learning strategies by assessing them at the course level, rather than at a general level.

The MSLQ has been under development formally since 1986 when the National Center for Research on improving Postsecondary Teaching and Learning (NCRIPTAL) at the University of Michigan was funded and informally since 1982. During 1982-1986, self-report instruments to assess students' motivation and use of learning strategies (varying from 50 to 140 items) were used to evaluate the effectiveness of the "Learning to Learn" course offered at the University of Michigan (see McKeachie, Pintrich & Lin, 1985; Pintrich, McKeachie & Lin, 1987). These measures were used with over 1000 University of Michigan undergraduates enrolled in the course. These early instruments were subjected to the usual statistical and psychometric analyses, including internal reliability coefficient

computation, factor analysis, and correlations with academic performance and aptitude measures (e.g., SAT scores). The items have undergone continuous revisions on the basis of these results.

The formal development of the MSLQ began in earnest when NCRIPTAL was founded in 1986. NCRIPTAL was funded for research on college populations excluding major research institutions like the University of Michigan. Accordingly, the MSLQ was administered at three collaborating institutions in the Midwest: a 4-year public, comprehensive university; a small liberal arts college; and a community college. There were three major waves of data collection with previous versions of the MSLQ used with students from these three institutions: 1986, 1987, and 1988. The items on these previous versions of the MSLQ also underwent the usual statistical and psychometric analyses including internal reliability coefficient computation, factor analyses, and correlations with academic performance measures. The first wave of data collected in 1986 included 326 students; the second wave in 1987 included 687 students; and the third wave in 1988 included 758 students. After each of these waves the data were analyzed and items revised as the conceptual model underlying the instrument was refined.

The final version of the MSLQ discussed here reflects the past dozen years of work on these various waves of data collection. The instrument is designed to be given in class and takes approximately 20-30 minutes to administer. There are two sections to the MSLQ, a motivation section and a learning strategies section. The 81 items on this version of the MSLQ are scored on a 7-point Likert scale, from 1 (not at all true of me) to 7 (very true of me). The motivation section consists of 31 items that assess students' goals and value beliefs for a course, their beliefs about their skills to succeed in a course, and their anxiety about tests in a course (see Figure 1). The learning strategy section includes 50 questions: 31 items regarding students' use of different cognitive and metacognitive strategies and 19 items concerning student management of different learning resources (see Figure 2).

The questionnaire as a whole and all items are designed to be answered in terms of the students' motivation and use of learning strategies for a specific course. Students usually take the questionnaire during the actual meeting time of the class and are asked to respond about their motivation and use of learning strategies for that specific course. By having them respond to the MSLQ while physically sitting in the classroom for the course with the instructor, the other students, and course books and materials actually present, we hope that these cues will stimulate the respondents to think about their actual beliefs and behavior for that course, thereby increasing accuracy. In addition, our theoretical model assumes that students' motivation and learning strategies are contextualized and situation-specific, not generalized individual differences or learning styles. Accordingly, we did not operationalize the MSLQ at the general level of having students respond in terms of their general approach to all learning situations or all classroom learning (cf. the LASSI, Weinstein, Zimmerman & Palmer, 1988). We assume that students' motivation varies for different courses (e.g., more interest or value in an elective course vs. a required course; more efficacy for an easier course in psychology in

comparison to a difficult math or physics course) and that their strategy use might vary as well depending on the nature of the academic tasks (e.g., multiple choice vs. essay exams). At the same time, in terms of practical utility, we did not think it useful to operationalize the questionnaire items in terms of all the various tasks and situations that a student might confront in one course (e.g., studying for a test; trying to understand one lecture; reading one chapter in a textbook; writing a final paper or studying for the comprehensive final exam). We chose the course level as an appropriate level for our items as a reasonable compromise between the very general and global level of all learning situations and the impractical and unwieldy level of every specific situation within one course.

Scale scores are constructed by taking the mean of the items that make up that scale. For example, intrinsic goal orientation has four items (see Table 1). An individual's score for intrinsic goal orientation would be computed by summing the four items and taking the average. There are some negatively worded items and the ratings should be reversed before an individual's score is computed, so that the statistics reported represent the positive wording of all the items and that higher scores indicate greater levels of the construct of interest. The 15 different scales on the MSLQ can be used together or singly. The scales are designed to be modular and can be used to fit the needs of the researcher or instructor.

The motivational scales are based on a broad social-cognitive model of motivation that proposes three general motivational constructs (Pintrich, 1988a, 1988b, 1989): expectancy; value; and affect. Expectancy components refer to students' beliefs that they can accomplish a task, and two MLSQ subscales are directed towards assessing perceptions of self-efficacy and control beliefs for learning. Our definition and measurement of self-efficacy is a bit broader than other measures (e.g., the LASSI, Weinstein, Zimmerman & Palmer, 1988), in that both expectancy for success (which are specific to task performance) and judgments of one's ability to accomplish a task and confidence in one's skills to perform a task are collapsed within the general term "self-efficacy." Control beliefs for learning refer to students' beliefs that outcomes are contingent upon one's own effort, rather than external factors such as the teacher or luck. Value components focus on the reasons why students engage in an academic task. Three subscales are included in the MSLQ to measure value beliefs: intrinsic goal orientation (a focus on learning and mastery); extrinsic goal orientation (a focus on grades and approval from others); and task value beliefs (judgments of how interesting, useful, and important the course content is to the student). The third general motivational construct is affect, and has been operationalized in terms of responses to the test anxiety scale, which taps into students' worry and concern over taking exams.

The learning strategies section of the instrument is based on a general cognitive model of learning and information processing (see Weinstein & Mayer, 1986). There are three general types of scales: cognitive; metacognitive; and resource management. Cognitive strategies include students' use of basic and complex strategies for the processing of information from texts and lectures. The most basic cognitive strategy subscale provides a measure of the use of rehearsal by students (e.g., repeating the

words over and over to oneself to help in the recall of information). The use of more complex strategies are measured by two subscales concerning the use of elaboration strategies (e.g., paraphrasing, summarizing) and organization strategies (e.g., outlining, creating tables). In addition, a subscale on critical thinking is included, which refers student's use of strategies to apply previous knowledge to new situations or make critical evaluations of ideas. The second general category is metacognitive control strategies, which is measured by one large subscale concerning the use of strategies that help students control and regulate their own cognition. This subscale includes planning (setting goals), monitoring (of one's comprehension), and regulating (e.g., adjusting reading speed depending on the task). The third general strategy category is resource management, which includes four subscales on students' regulatory strategies for controlling other resources besides their cognition. These strategies include managing one's time and study environment (e.g., using one's time well, having an appropriate place to study), as well as regulation of one's effort (e.g., persisting in the face of difficult or boring tasks). Finally, the remaining two subscales, peer learning (e.g., using a study group or friends to help learn) and help-seeking (e.g., seeking help from peers or instructors when needed) focus on the use of others in learning.

Psychometric Properties of the MSLQ

Construct Validity. In order to test the utility of the theoretical model and its operationalization in the final version of the MSLQ scales, we used data gathered from 380 Midwestern college students enrolled in 37 classrooms (spanning 14 subject domains and five disciplines: natural science, humanities, social science, computer science, and foreign language) to perform two confirmatory factor analyses: one for the set of motivation items and another for the set of cognitive and metacognitive strategy items (Pintrich, Smith, Garcia, & McKeachie, 1993). Structural equation modeling was used to estimate parameters and test the models. In contrast to exploratory factor analysis, confirmatory factor analysis requires the identification of which items (indicators) should fall onto which factors (latent variables). Parameter estimates for the model specified were generated using maximum likelihood, and tests for goodness-of-fit were made. The goodness-of-fit tests assessed how well correlations that were reproduced, given the model specified, "matched up" with the input set of correlations.

In other words, confirmatory factor analysis allowed for a quantitative test of the theoretical model. For example, we have four items that are assumed to be indicators of a construct called Intrinsic Goal Orientation. The confirmatory factor analysis tested how closely the input correlations could be reproduced given the constraints that Items 1, 16, 22, and 24 all onto one specific factor (Intrinsic Goal Orientation); that Items 7, 11, 13, and 30 fall onto another factor (Extrinsic Goal Orientation); that Items 4, 10, 17, 23, 26, and 27 fall onto another (Task Value) and so forth. Each item on the MSLQ was constrained to fall on one specific latent factor. The 31 motivation items were tested to see how well they fit six correlated latent factors: (1) intrinsic goal orientation, (2) extrinsic goal orientation, (3) task value, (4) control beliefs about learning, (5) self-efficacy for learning and performance, and (6) test

anxiety (see Figure 1 for the measurement model). The 50 cognitive strategy items were tested to see how well they fit nine correlated latent factors: (1) rehearsal, (2) elaboration, (3) organization, (4) critical thinking, (5) metacognitive self-regulation, (6) time and study environment management, (7) effort regulation, (8) peer learning, and (9) help seeking (see Figure 2 for the measurement model). Therefore, the measurement models tested in the analyses followed the theoretical framework, and the structural models freely estimated the covariances between the latent constructs.

The goodness of fit indices generated by the LISREL program suggested that the general model of motivational components with six scales and the general model of cognitive components with nine scales were indeed reasonable representations of the data (Pintrich et al., 1993; cf. Garcia & Pintrich, 1991). Several omnibus fit statistics were calculated: the chi-square to degrees of freedom ratio (χ^2/df); the goodness-of-fit and adjusted goodness-of-fit indices (GFI and AGFI); and the root mean residual (RMR). A χ^2/df ratio of less than 5 is considered to be indicative of a good fit between the observed and reproduced correlation matrices (Hayduk, 1987); a GFI or AGFI of .9 or greater and an RMR of .05 or less are heuristic values that indicate that the model "fits" the input data well. The motivation model (see Figure 1) resulted in a GFI of .77, an AGFI of .73, an RMR of .07, and generated a χ^2/df ratio of 3.49 (Pintrich et. al., 1993). The six correlated latent factors model appears to be the best fitting representation of the input data, as the largest modification index provided by LISREL VI was 50.2, and making the modification did not substantively "improve" the overall fit indices for the motivation model (e.g., the GFI increased from .773 to .784; the RMR decreased from .074 to .072). Constraining the 50 learning strategies items to fall onto nine correlated latent factors generated a χ^2/df ratio of 2.26, a GFI of .78, an AGFI of .75, and an RMR of .08. The nine correlated latent factors model appears to be the best fitting representation of the input data, as the largest modification index provided by LISREL VI was 91.59, and modifying the model did not substantively "improve" the overall fit indices for the learning strategies model (e.g., the GFI increased from .779 to .789; the RMR decreased from .078 to .076). These results provide support for the soundness of the measurement and theoretical models for the two sections of the MSLQ.

Internal Consistency and Reliability. Internal consistency estimates of reliability (coefficient alphas) lend additional support for the strength of the psychometric properties of the MSLQ subscales (see Table 1). The coefficient alphas for the motivational scales are robust, demonstrating good internal consistency (Pintrich & Garcia, 1991; Pintrich, Smith, Garcia, & McKeachie, 1991; Pintrich et al., 1993). Task value beliefs concerning students' ratings about how interesting, useful, and important the course material is to them typically have a very high alpha (averaging .90 across our datasets), as do students' judgments of their self-efficacy for learning (averaging .93). The Test Anxiety and Intrinsic Goal Orientation subscales yielded good internal consistency estimates (generally .80 and .74 respectively). Extrinsic goal orientation and control of learning beliefs tend to show more variability in students' responses, with coefficient alphas averaging at about .65. Similarly, the alphas for the

learning strategies scales are reasonable, with most of the coefficient alphas averaging above .70. However, help-seeking typically has the lowest alpha (below .60). This scale asks about seeking help from both peers and instructors and it may be that students tend to seek help from only one of these sources. Taken together, however, the confirmatory factor analyses discussed above and alphas of each of the fifteen scales suggest that the general model of motivational components with six scales and cognitive components with nine scales are a reasonable representation of the data.

Predictive Validity. We have examined predictive validity in terms of the relations between the MSLQ scales and standardized course grades (course grades were standardized to control for instructor grading differences). The motivational subscales showed significant correlations with final grade, and were in the expected directions, adding to the validity of the scales. Students who approached their course with an intrinsic goal for learning, who believed that the material was interesting and important, who had high self-efficacy beliefs for accomplishing the tasks, and who rated themselves as in control of their learning were more likely to do well in terms of course grade (average r = .29). At the same time, students who reported being anxious about test overall were less likely to do well in the course (average r = -.26; e.g., Pintrich & Garcia, 1991; Pintrich et al., 1993).

Most of the learning strategy subscales also showed the expected correlations with course grade. Students who relied on deeper processing strategies like elaboration, organization, critical thinking, and metacognitive self-regulation were more likely to receive higher grades in the course (average r = .21). Students who successfully managed their own time and study environment, as well as their own efforts (persistence at difficult tasks) were more likely to perform better in their courses (average r = .30). Surprisingly, the use of rehearsal, peer learning and help-seeking strategies are not significantly related to grades; this may be due to the fact that both high and low achieving students engage in these strategies to the same extent.

Multivariate analyses have lent further support for the predictive utility of the MSLQ. For students in the computer and natural sciences, the fifteen subscales accounted for a total of 39% of the variance in final course grade; self-efficacy and time and study environment management were the strongest predictors, with betas of .35 and .49, respectively. For students in the social sciences, humanities, and foreign language classes, the fifteen subscales accounted for a total of 17% of the variance in final course grade; however, the two strongest predictors, test anxiety and effort management, were only marginally significant ($p < .10$), with betas of -.12 and .16, respectively. In other studies (e.g., Pintrich & De Groot, 1990) we found that a subset of these variables accounted for 22% of the variance in final course grade. Given that many factors can account for the variance in the grades that teachers assign, these modest amounts of explained variance seem reasonable.

Practical Utility. It has been our policy to provide students feedback on the MSLQ as a form of compensation for their participation in our studies. We have chosen nine scales of the MSLQ (Task Value, Self-Efficacy for Learning and Performance, Test Anxiety, Rehearsal, Elaboration,

Organization, Metacognition, Time and Study Environment Management, and Effort Regulation) on which to give students feedback. The student's individual scores, the class' scale means, and quartile information for that class are included in the feedback form. We provide descriptions of each scale and also offer suggestions to students on how to increase their levels of motivation and strategy use. Although we have not done any formal research on the effects of this feedback on students' motivation, use of learning strategies, and performance, students do tell us that they find the feedback quite helpful and informative. We have also provided instructors with feedback on their course's motivation and use of learning strategies (at the group level, not the individual student level), and instructors too have found this information helpful in adapting the content and pace of the class. Of course, the amount of and type of feedback may be adapted to the researcher's or instructor's needs.

We have not provided norms for the MSLQ and have no plans to do so given our theoretical assumptions of situation-specificity. It is designed to be used at the course level. As noted previously, we assume that students' responses to the items might vary as a function of different courses, so that the same individual might report different levels of motivation or strategy use depending on the course. If the user desires norms for comparative purposes over time, we suggest the development of local norms for the different courses or instructors at the local institution.

The 15 different scales on the MSLQ can be used together or singly. The scales are designed to be modular and can be used to fit the needs of the researcher or instructor. The instrument is designed to be given in class and takes approximately 20-30 minutes to administer. Because of its modularity, flexibility, ease of administration, and sound psychometric properties, the MSLQ has shown to be a practical and useful means for assessing college students' motivation and learning strategies.

Conclusions

Although the validity of self-report measures has been questioned (e.g., Nisbett & Wilson, 1977), the criticisms made are themselves flawed, as the critiques stem from data on respondents' misattributions (inaccurate ascriptions to "why did X happen?") rather than respondents' reports about their behaviors (e.g., "I do X when I study") or attitudes (Ericsson & Simon, 1993). That is, direct articulation of information stored in memory (such as a behavior in which one engages or an attitude which one holds) has been shown to be accurate and veridical, whereas verbalizations which are products of intermediate processing, such as abstractions, inferences, or attributions, are more subject to distortion (Ericsson & Simon, 1993). According to Ericsson & Simon (1993), the issue for researchers then becomes one of methodology, and they provide ample evidence for the utility of verbal reports as data. Similarly, survey researchers, who use self-report methods almost exclusively, have an entire literature on question-writing (e.g., Converse & Presser, 1986) and response effects (e.g., Bradburn, 1983; Wentland & Smith, 1993). This body of work suggests that while certain information may be unavailable in memory, the degree of response accuracy and consistency (even to sensitive questions) vary according to specific attributes of questions such as wording or length, indicating that particular

conditions and stimuli facilitate information retrieval (Wentland & Smith, 1993). Admittedly, the use of self-report questionnaires does trade some internal validity for external validity, but we are confident that given careful construction of questions and conscientious administration of the instrument, relatively high levels of accuracy may be maintained.

The results suggest that the Motivated Strategies for Learning Questionnaire has relatively good reliability in terms of internal consistency. The general theoretical framework and the scales that measure it seem to be valid given the results of the two confirmatory factor analyses. The six motivational subscales and the nine learning strategies subscales represent a coherent conceptual and empirically validated framework for assessing student motivation and use for learning strategies in the college classroom (Pintrich et al., 1993). The six motivational scales measure three general components of college student motivation that seem to be distinct factors. In addition, the learning strategy scales represent an array of different cognitive, metacognitive, and resource management strategies that can be reliably distinguished from one another on both conceptual and empirical grounds. Finally, the subscales seem to show reasonable predictive validity. The motivational scales were related to academic performance in the expected directions. In the same fashion, the learning strategies scales were positively related to course grade. These significant, albeit modest relations with course grade are reasonable, given the many other factors that are related to college course grade that are not measured by the MSLQ (individual course grades themselves are not very reliable measures of performance or learning). The MSLQ seems to represent a useful, reliable, and valid means for assessing college students' motivation and use of learning strategies in the classroom.

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Table 1

Coefficient alphas and items comprising the fifteen MSLQ scales

Scale	Items Comprising the Scale	Alpha
Motivation Scales		
Intrinsic Goal Orientation	1, 16, 22, 24	.74
Extrinsic Goal Orientation	7, 11, 13, 30	.62
Task Value	4, 10, 17, 23, 26, 27	.90
Control of Learning Beliefs	2, 9, 18, 25	.68
Self-Efficacy for Learning & Performance	5, 6, 12, 15, 20, 21, 29, 31	.93
Test Anxiety	3, 8, 14, 19, 28	.80
Learning Strategies Scales		
Rehearsal	39, 46, 59, 72	.69
Elaboration	53, 62, 64, 67, 69, 81	.75
Organization	32, 42, 49, 63	.64
Critical Thinking	38, 47, 51, 66, 71	.80
Metacognitive Self-Regulation	33r, 36, 41, 44, 54, 55, 56, 57r, 61, 76, 78, 79	.79
Time & Study Environment Management	35, 43, 52r, 65, 70, 73, 77r, 80r	.76
Effort Regulation	37r, 48, 60r, 74	.69
Peer Learning	34, 45, 50	.76
Help-Seeking	40r, 58, 68, 75	.52

Figure 1

Measurement model of student motivation based on the MSLQ (from Pintrich et al., 1993). Note: the numbers on the arrows represent the lambda-ksi estimates of the standardized solution.

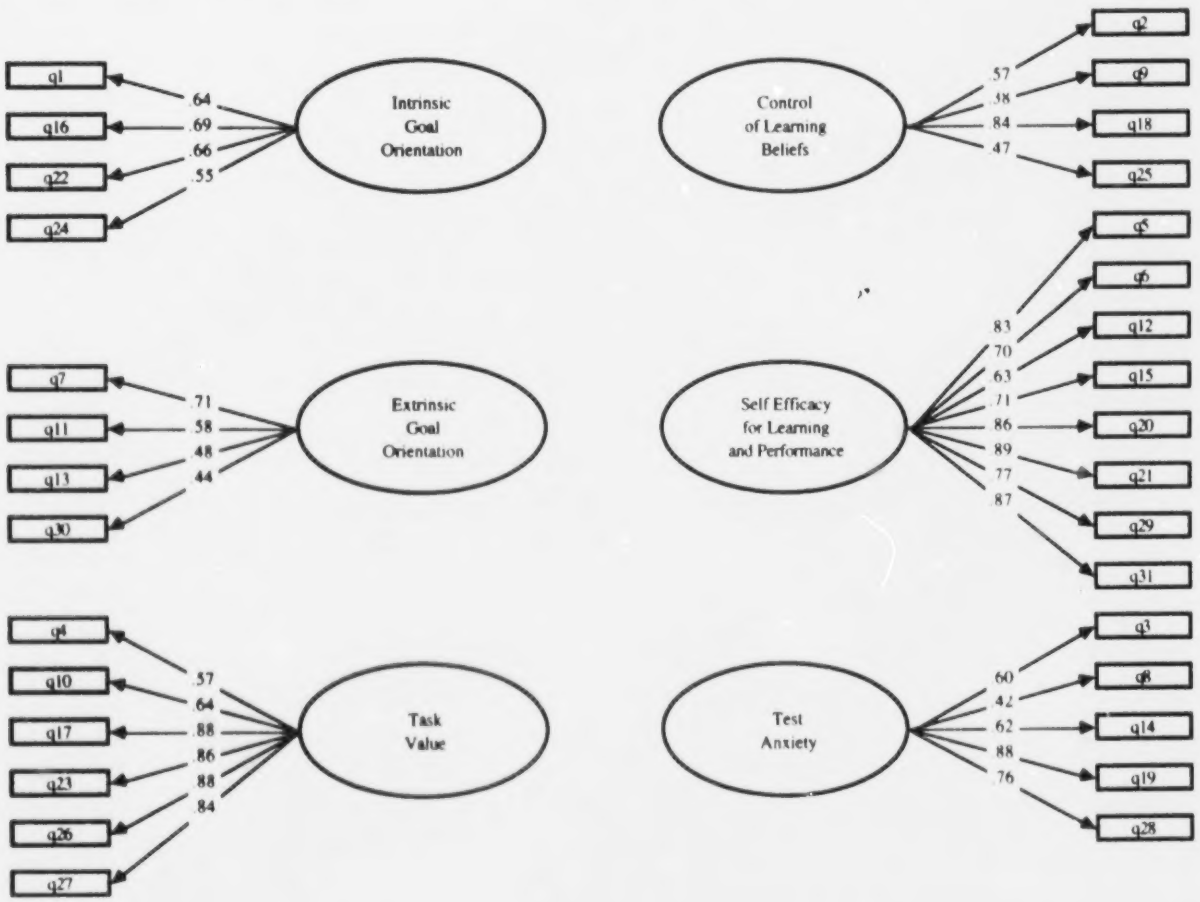

Figure 2

Measurement model of student learning strategies based on the MSLQ (from Pintrich et al., 1993). Note: the numbers on the arrows represent the lambda-ksi estimates of the standardized solution.